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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/584,083

06/22/2006

Toshio Ogawa

128469

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25944

7590

01/23/2008

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EXAMINER

ROSENAU, DEREK JOHN

ART UNIT

PAPER NUMBER

2834

MAIL DATE

DELIVERY MODE

01/23/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/584,083

Applicant(s)

OGAWA, TOSHIO

Examiner

Derek J. Rosenau

Art Unit

2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 6/21/2006.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 7 recites the limitation "the ... adhesive layer". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 3, 4, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Levy et al. (US 20040183408) in view of Ogawa et al. (US 20030178914).
4. With respect to claim 1, Levy et al. discloses a piezoelectric device (Fig 4) formed by sticking to a metal plate (item 56) a single crystal plate (item 25) which is made of a $\text{Pb}(\text{Zn}_{1/3}\text{Nb}_{2/3})\text{O}_3 - \text{PbTiO}_3$ solid solution or a $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3 - \text{PbTiO}_3$ solid solution single crystal (Paragraph 27).

Levy et al. does not disclose expressly that the solid solution single crystal is brought into a mono-domain in the thickness direction and in the plate surface to impart a giant-lateral-effect piezoelectric characteristic thereto, while the mono-domain is kept as it is.

Ogawa et al. teaches a piezoelectric device in which the PMNT or PZNT solid solution single crystal piezoelectric materials can be brought into a mono-domain in the thickness direction and in the plate surface (Fig 9) to impart a giant-lateral-effect

piezoelectric characteristic thereto (Paragraph 42), while the mono-domain is kept as it is.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the mono-domain piezoelectric material of Ogawa et al. with the piezoelectric device of Levy et al. for the benefit of maximizing the electromechanical coupling coefficient (Paragraph 42 of Ogawa et al.).

5. With respect to claim 3, the combination of Levy et al. and Ogawa et al. discloses the piezoelectric device according to claim 1. The claim language "wherein the single crystal plate is a single crystal plate whose piezoelectric characteristic is not deteriorated from a value immediately after polarization with the lapse of time" is merely a property of the claimed invention that does not, by itself, result in additional structure. Therefore, as the combination of Levy et al. and Ogawa et al. disclose each of the claimed structural elements, the combination would inherently have the same properties.

6. With respect to claim 4, the combination of Levy et al. and Ogawa et al. discloses the piezoelectric device according to claim 1. Levy et al. discloses that the piezoelectric device is formed as a piezoelectric unimorph (paragraph 68). Ogawa et al. discloses that the piezoelectric device has a bending-vibration-mode electromechanical coupling coefficient not smaller than 50% (Paragraph 42).

7. With respect to claim 6, the combination of Levy et al. and Ogawa et al. discloses the piezoelectric device according to claim 1. The claim language "wherein six faces of the mono-domain single crystal plate are used as a face which prevents domain wall

movement" is merely functional language and properties of the claimed invention, and this language does not, by itself, result in additional structure. Therefore, as the combination of Levy et al. and Ogawa et al. discloses each of the claimed structural elements, the combination would inherently be capable of the same functions and would have the same properties.

8. Claims 2 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Levy et al. in view of Ogawa et al. and Hayashi et al. (US 5233256).

9. With respect to claim 2, the combination of Levy et al. and Ogawa et al. discloses the piezoelectric device according to claim 1.

Neither Levy et al. nor Ogawa et al. discloses expressly that the single crystal plate and the metal plate are repeatedly laminated with each other.

Hayashi et al. teaches a piezoelectric device in which piezoelectric plates and metal plates are repeatedly laminated with each other (Figs 5, 6, 9, 10, 11, and 14-23).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the laminated-arrangement of Hayashi et al. with the piezoelectric device of Levy et al. as modified by Ogawa et al. for the benefit of being able to generate larger displacements (column 2, lines 10-15 of Hayashi et al.).

10. With respect to claim 5, the combination of Levy et al. and Ogawa et al. discloses the piezoelectric device according to claim 1. Ogawa et al. discloses that the piezoelectric device has a bending-vibration-mode electromechanical coupling coefficient not smaller than 60% (Paragraph 42).

Neither Levy et al. nor Ogawa et al. discloses expressly that the piezoelectric device is formed as a bimorph.

Hayashi et al. teaches a piezoelectric device formed as a bimorph (column2, lines 10-15).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the bimorph arrangement of Hayashi et al. with the piezoelectric device of Levy et al. as modified by Ogawa et al. for the benefit of being able to generate larger displacements (column 2, lines 10-15 of Hayashi et al.).

11. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Levy et al. in view of Ogawa et al. and Clingman et al. (US 6994762).

12. With respect to claim 7, the combination of Levy et al. and Ogawa et al. discloses the piezoelectric device according to claim 1. The claim language "wherein the metal plate and adhesive layer that sticks the single crystal plate are used as a member which prevents domain wall movement" is merely functional language and properties of the claimed invention, and this language does not, by itself, result in additional structure. Therefore, as the combination of Levy et al. and Ogawa et al. discloses each of the claimed structural elements, the combination would inherently be capable of the same functions and would have the same properties.

Neither Levy et al. nor Ogawa et al. discloses expressly an adhesive layer that sticks the metal plate and the single crystal plate.

Clingman et al. teaches a piezoelectric device in which an adhesive layer that sticks the metal plate and piezoelectric plate (column 2, line 61 through column 3, line 15).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the adhesive layer of Clingman et al. with the piezoelectric device of Levy et al. as modified by Ogawa et al. for the benefit of better securing the metal plate and single crystal plate.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Rosemann et al. (US 20050023462) discloses a piezoelectric device formed with a mono-domain in the thickness direction and in the plate surface.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derek J. Rosenau whose telephone number is 571-272-8932. The examiner can normally be reached on Monday thru Thursday 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on 571-272-2044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

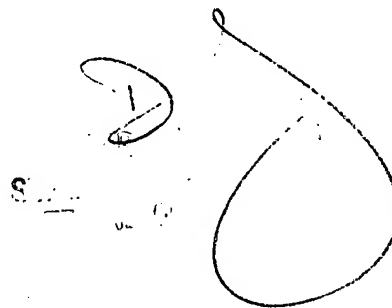
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Derek J Rosenau
Examiner
Art Unit 2834

DJR
1/14/2008

A handwritten signature in black ink, appearing to read 'Derek J. Rosenau', is located in the bottom right corner of the page. The signature is stylized with a large, sweeping loop.